THE INSECT PEST SURVEY BULLETIN

Volume 16 | Summary for 1936 | Number 10

BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
UNITED STATES
DEPARTMENT OF AGRICULTURE
AND
THE STATE ENTOMOLOGICAL
AGENCIES COOPERATING

I N S E C T P E S T S U R V E Y B U L L E T I N

Vol. 16 Summary for 1936 No. 10

INTRODUCTION

An excellent opportunity for the study of the effect of weather on the abundance and distribution of insects was afforded by the year 1936, as the entire year was characterized by extremes in climatic conditions. The winter was abnormally cold over the entire United States, except in the southern Rocky Mountain and Great Basin States, and a narrow strip on the coast in the Northwest. Snowfall was the heaviest in many years in the region north of the Potomac, the Ohio, and the Missouri Rivers. The summer was unprecedently dry and hot from the Rocky Mountains to the Appalachians and abnormally dry in the Eastern States.

The break in the severe winter weather came the latter part of February and, following this, temperatures were almost continuously above normal for the month of March, except in the Western and Northwestern States, where abnormally cold weather prevailed the last week of the month.

The month of April was cooler than normal over nearly all sections of the country east of the Rocky Mountains and warmer than normal generally west of the Rockies.

The temperature for May was above normal in practically all parts of the country. Precipitation varied greatly in different areas, ranging from much above normal to markedly deficient, the latter predominating. The Southwest had heavy rains, the northern Plains States were dry, and from the Mississippi Valley eastward the month was one of the driest Mays of record.

The very dry weather started in June, when the entire country east of the Rocky Mountains, except Florida, had deficient rainfall. During the summer the country lying between the Rocky Mountains and the Appalachians experienced unprecedently hot, dry weather, rainfall over large areas being less than half of normal. There was some lack of rain in the Eastern States. In the States west of the Rocky Mountains rainfall was above normal.

August brought rain to the Northeastern States, the Lake region, the Upper Mississippi and Ohio Valleys, small isolated areas in the Gulf and South Atlantic States, parts of Colorado, and much of the Great Basin and plateau regions; but over more than half of the country, embracing the heart of the agricultural region, the rainfall was markedly deficient. In September rainfall was above normal over most sections east of the Rocky Mountains, except the northern Plains States, bringing to a close one of the most disastrous droughts in the history of the United States.

A comparison of the weather with insect conditions represented in reports received by the Insect Pest Survey, brings out some interesting correlations. Observations made from the reports on a few insects are cited, to illustrate the possibilities of the use that might be made of extensive and complete reports on the distribution of insects.

A high winter mortality was reported for several species of insects, and especially those species that have pushed their range northward during the last few years of mild winter weather. The winter of 1934-35 was abnormally cold only in the northeastern part of the country.

The San Jose scale was reported as having been almost completely wiped out above the snow line in areas in the East Central States, where in recent years it has been reported as increasingly destructive, as well as advancing northward in its range. In 1933 the scale was reported in some abundance in areas in the Northeastern States. In the Spring of 1934 high winter killing was reported, although reports of injury followed during the summer. In 1935 very few reports were received from that region, and in 1936 only two reports were received from northeast of the Potomac River. On the other hand, the European elm scale, a northern species, evidently experienced no abnormal winter mortality.

The tobacco flea beetle, which has been reported as very destructive in the tobacco-growing section of Kentucky and Tennessee during the last few years, was not reported from that section in 1936. It was reported, however, from North Carolina. Other flea beetles were reported in at least normal abundance from most parts of the Eastern States.

Soil samples taken from fields in New Jersey, where sweet corn was heavily infested by the corn ear worm in 1935, were examined in October 1935 and found to contain living pupae. Similar soil samples were examined in April 1936, and no living pupae were found. A few reports of high winter mortality of this insect were received from other States. This fact, with almost no reports of injury by the larvae early in the summer, indicates low winter survival. Reports late in the summer and fall indicate that the insect had built up destructive populations.

The hessian fly suffered high winter mortality, which, coupled with unfavorable weather in the Spring of 1936, checked the impending outbreak.

The harlequin bug, a southern species, advances northward in years of mild weather. The last few years have been favorable and, beginning about 1932, reports indicate its occurrence in destructive abundance north to a line from Central Ohio westward to southern Iowa. During the season of 1936, it was not reported north of 35° north latitude, except at Norfolk, Va.; the southern tip of Ohio, in Lawrence County; and in east-central Kansas, in Douglas County.

Extremes in the weather caused fluctuations in codling moth populations. The cold winter killed many of the overwintering larvae in the eastern part of the country, but warm weather in May stimulated activity, affording the species an early start, and it staged a very rapid comeback in most central and eastern localities, although reduced during the summer by the dry hot weather in a few west-central States.

As a result of the high winter mortality of the boll weevil, combined with the effect of the drought, this insect was less abundant than at any time since its establishment throughout the Cotton Belt, except in Texas.

Unseasonably cold weather in Florida in February 1936 prevented the blooming of wild plants, resulting in a scarcity of thrips. It also prevented tender growth of citrus on which the citrus aphid feeds, thereby causing a scarcity of this insect.

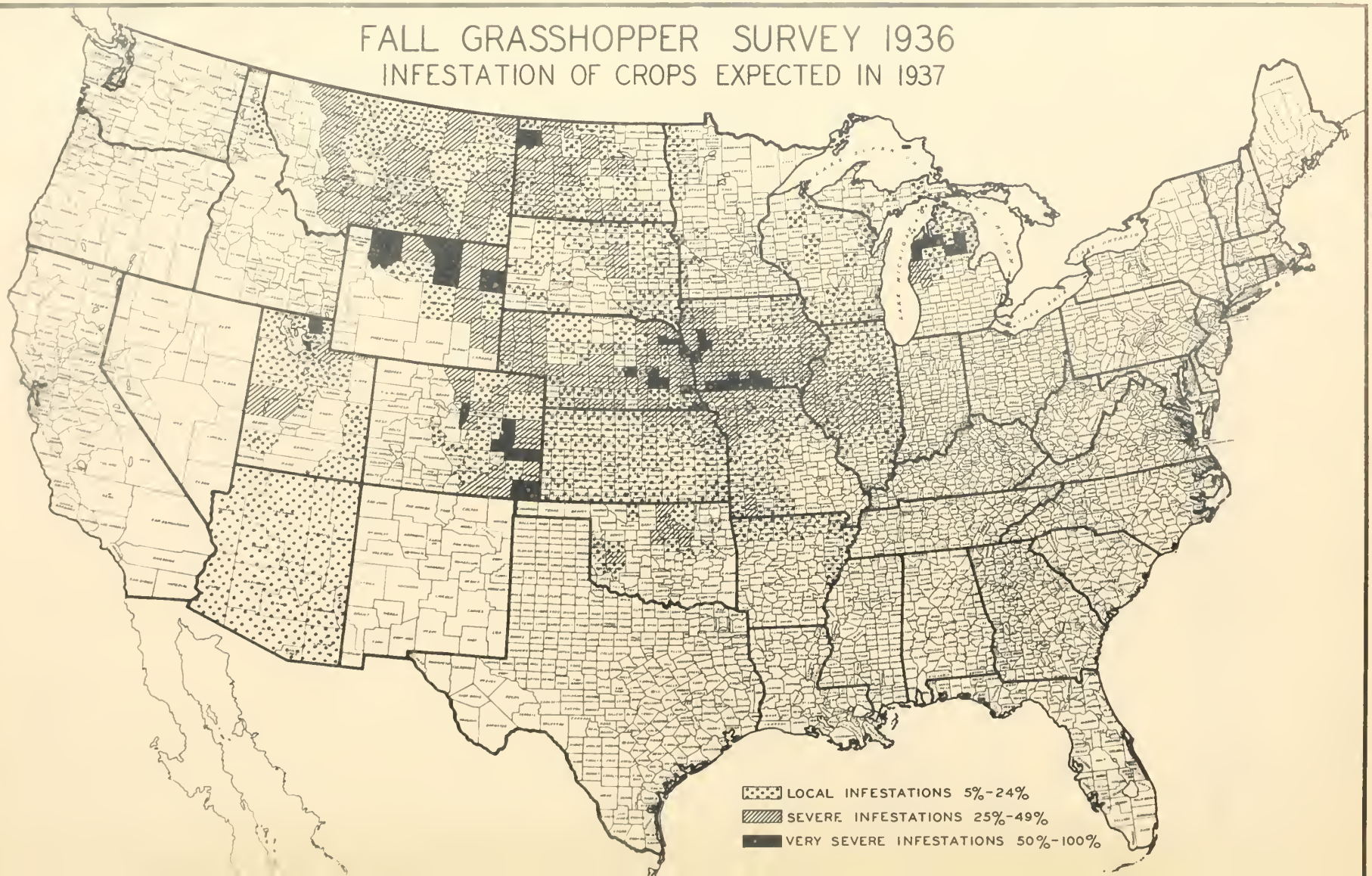
The drought had a deleterious effect on the chinch bug by drying up its food plants in the western part of its range.

Other insects affected by the weather include the grubs of the japanese beetle, which were killed by the cold, as were also the eggs of the gypsy moth, and the Mexican bean beetle and grasshoppers, which were repressed by the heat.

The effects of the unusual weather of the year will probably be reflected in insect conditions during the coming year, and reports on all observations made over the country will help to build up evidence from which to draw additional conclusions on the effect of weather on insect pests.

FALL GRASSHOPPER SURVEY 1936

INFESTATION OF CROPS EXPECTED IN 1937



INSECT PESTS

GRASSHOPPERS

During the summer of 1936 grasshoppers extended their previous zone of severe infestation in the Northern Great Plains and Upper Mississippi Valley and pushed southward to Arkansas, Oklahoma, and Texas. Extensive crop damage took place in Illinois, Iowa, Kansas, Missouri, Montana, Nebraska, Oklahoma, and Wyoming. The value of crops destroyed in these States has been estimated at approximately $80,000,000. Less extensive crop damage occurred in Arkansas, California, Colorado, Minnesota, Michigan, North Dakota, Oregon, South Dakota, Texas, Utah, and Wisconsin. In addition to losses in cultivated crops, the hoppers severely injured range grass and pastures in Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming.

After the coldest winter on record (the mean monthly temperature for North Dakota for February 1936 was -14°F.), the weather over the grasshopper-infested area suddenly broke hot and dry about May 1, and continued on into the hottest and driest summer on record. Daily maximum temperatures of above 100° occurred in many parts of the territory during about 17 days in June, 25 days in July, 25 days in August, and even a day or so during the first week of September. Maximum air temperatures broke all-time records from 118° to 121°. Some areas went without a drop of moisture for over 100 consecutive days.

Hatching was first recorded on April 20 at Huntley, Mont. In other parts of the area -- the Dakotas, Iowa, Nebraska, Michigan, Wisconsin, Kansas, and Colorado -- first hatching occurred from May 1 to May 18. Because of the hot, dry weather, the nymphs developed rapidly and depredations started early. Adults of Melanoplus bivittatus Say and M. mexicanus Sauss. were taken early in June in Iowa and Montana, most individuals becoming adult by June 15. On the other hand, in Oklahoma most of the M. bivittatus and M. differentialis Thos. did not reach the adult stage until after July 1. Active control measures to protect crops were necessary in the Yellowstone Valley, Mont., by the first week of May and in other States by the 15th. May rains in Iowa, Nebraska, Kansas, and Oklahoma held the hoppers in check and allowed most of the small grain to escape their ravages.

Nymphs first appeared in the alfalfa, grain, and pasture lands. When these were cut or when they had dried up, the hoppers moved into the corn and other late crops. This general movement took place the last week of June. As the intense heat continued in July, the next move was to take to the trees, shrubs, fence posts, telephone and telegraph poles, and, where there were no trees, to tall weeds. The only available moisture was in the bark and leaves of the trees and shrubs, which the roosting hoppers barked and defoliated. In parts of Kansas, Nebraska, and Oklahoma the Osage-orange is used for hedge fences, and these were stripped bare. Many orchards suffered. Along water courses

in groves and shelterbelts, the willows, poplars, mulberries, and even elms and other trees were defoliated. Fields of 12-foot corn were made to look like forests of fishing poles. In Oklahoma one-tenth of the cotton crop was damaged by July 1.

Careful observations have shown that the optimum air temperatures for activity on the ground are between 75° and 85°F. with surface-soil temperatures under 113°. Above these temperatures the hoppers either take to the air or roost in the shade as high off the ground as possible. With air temperatures this past summer remaining above 90° for the greater part of the day and for day after day, it is no wonder that the pests took to the trees and did such spectacular damage.

Over the whole area, oviposition was quite erratic. In northwestern Iowa, Melanoplus bivittatus had completed its life cycle and laid its eggs by August 10. M. mexicanus laid its eggs early enough over a large part of the area to produce a partial second generation. In eastern Nebraska and western Iowa this second generation hatched about the last week of August. This same phenomena was observed last year in a number of places, but seemed more general this year. In Oklahoma, M. differentialis was still congregated in the trees, shrubs, and tall weeds on September 18, when few eggs had been deposited. Where rains had occurred 2 weeks before this date, egglaying was well started. In a large part of this area the first moisture for all summer came in a general downpour on September 16-18. In these dry areas no egg deposition took place and no well-developed eggs were found in the females before the fall rains began. On the uplands of Kansas, egg deposition by M. differentialis began about October 19. At this time along the Missouri River bottom in eastern Nebraska and western Iowa, where green food was more abundant, oviposition by this species was completed.

The heat and drought, no doubt, destroyed many of the adults. Observers report that the hoppers were so inactive during the extreme heat that it was possible to walk up and pick them off the fence posts and shrubs without disturbing them. G. A. Bieberdorf, in Oklahoma, reported a heavy mortality among M. differentialis under such conditions. Workers in other States reported the same thing, these reports being corroborated by farmers and county agents. In these areas it is very probable that many female adults died without depositing eggs.

The map for the fall survey for 1936 shows the relative distribution of the infestations expected in 1937. This is based on the combined adult-and-egg survey conducted by the Bureau of Entomology and Plant Quarantine, in cooperation with State agencies. Infestations are most severe in Illinois, Missouri, Iowa, Nebraska, Kansas, North Dakota, Montana, Wyoming, and Colorado, and less severe in Michigan, Wisconsin, South Dakota, and Oklahoma.

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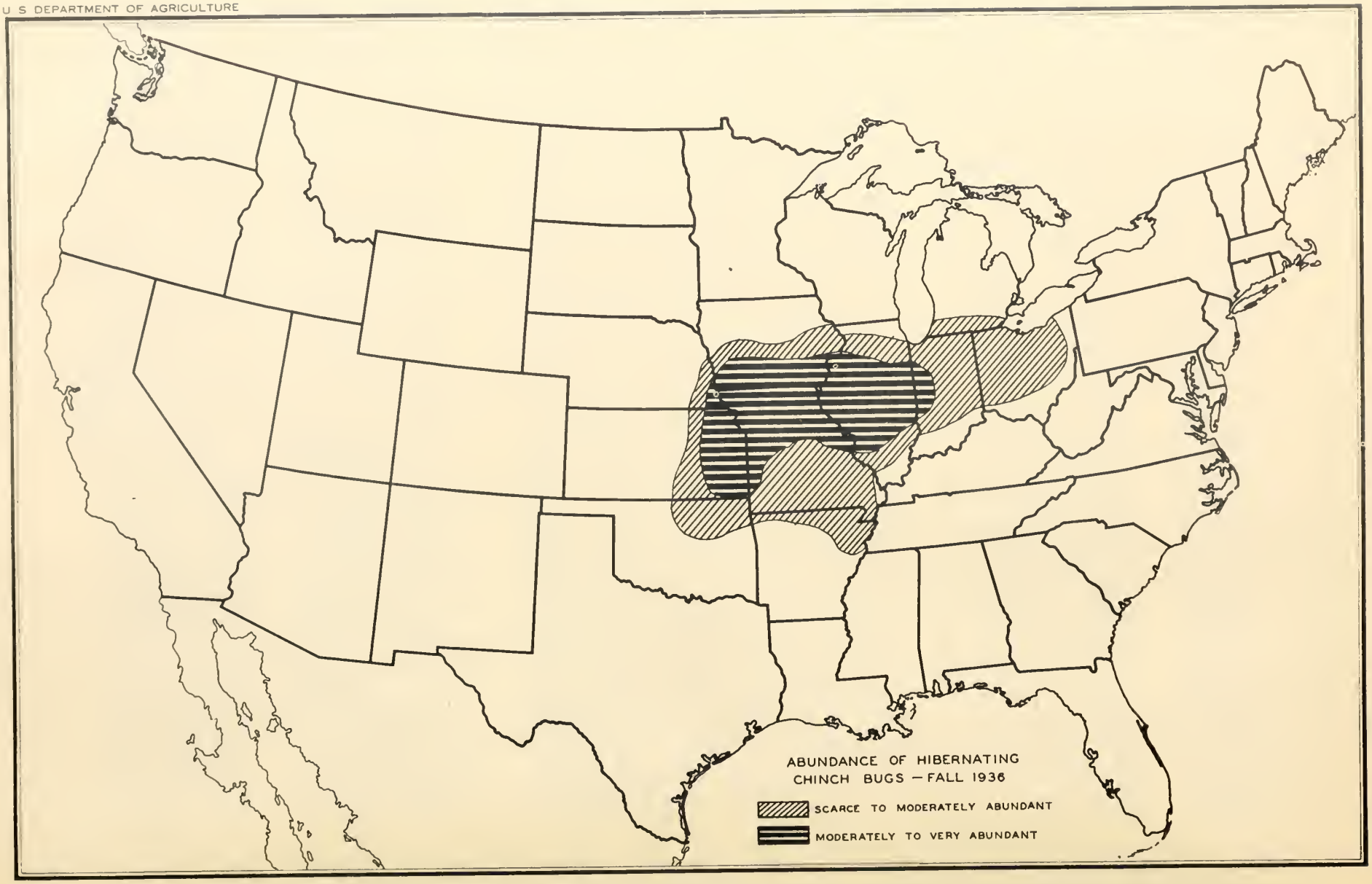


Combinations of M. mexicanus, M. bivittatus, M. femur-rubrum Deg., and several range species were dominant in the Northern States. Combinations of these named species plus M. differentialis were the most important hoppers in the Southern States. In Colorado Dissosteira longipennis Thos. was numerous and dominant in a large part of the range land in the southeastern quarter. (J. R. Parker and Robert L. Shotwell, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

EUROPEAN CORN BORER

This insect is treated fully by A. M. Vance of the Bureau of Entomology and Plant Quarantine, in a Supplement to No. 9 of the Insect Pest Bulletin (November 15, 1936).

CORN EAR WORM

The first report of the year of the occurrence of this insect was received in January from southeastern Texas. By the third week in March egg laying was observed in the coastal sections of northeastern Texas, and by that time the insect was damaging corn in Louisiana and other Gulf States, as well as in southern California. By the middle of May larvae were observed in Georgia and very heavy infestations in tomatoes were observed in parts of Mississippi and southern California. During the first week in July egg laying was observed in northern Iowa and the insects were severely damaging corn as far north as Kansas, Tennessee, and Kentucky, in the Mississippi Valley, and in Washington, on the Pacific coast. During the spring and summer the insect was generally scarce throughout the country, except for a few areas in Texas where considerable damage was done to cotton; however, in September populations developed rapidly from New England to Iowa and southward to North Carolina and Tennessee. Serious crop damage was quite generally reported throughout this region to tomatoes and late sweet corn. The outbreak on the Pacific coast developed to such an extent that in December 65 percent of the sweet corn was infested in some places in California.

CHINCH BUG

Hibernating chinch bugs were present in 1936 in moderate-to-extreme numbers in northern and central Illinois, southern Iowa, the northern half of Missouri, and eastern Kansas. About six counties in southwestern Iowa, and an area of similar size in southeastern Iowa, extending a few miles over into Illinois, contained extremely large numbers of bugs. Infestation was from light to moderate in a

belt of varying width surrounding the more heavily infested area just outlined and extending from south-central Oklahoma, east-central Kansas, and southeastern Nebraska to eastern Ohio, and from north-central Iowa to southern Missouri. Early spring reports indicate only about 50 percent winter survival in Ohio, northern Indiana, northern Illinois, and southern Iowa, but a much higher survival in Missouri and Kansas. In northern Oklahoma winter survival was reported to be only about 21 percent. Spring migration to and establishment in small grains was rather slow in the more northern areas but spring and early summer conditions were, in general, favorable to development of the first brood. Injurious migrations to corn occurred on occasional farms in scattered localities throughout the Corn Belt, from southwestern Michigan to extreme southeastern Nebraska and south into east-central Oklahoma and northern Arkansas. Injury to corn was also reported from the eastern Carolinas and Virginia, southeastern Minnesota, Mississippi, and southern Texas. Summer conditions were also favorable to the development of the second brood in corn in the more eastern part of the affected area, but in Kansas and Oklahoma the prolonged drought reduced infestations materially, along with the drying up of host plants. As a result of the early fall rains and more abundant food, however, the bugs made something of a late-season comeback in the Southwest. Fall conditions were fairly favorable to their activities and preliminary reports indicate that they are generally from moderately to extremely abundant in winter quarters from Western Indiana to southeastern Nebraska and eastern Kansas, and from southern Iowa to central Missouri and the Oklahoma-Kansas line. Scant to moderate numbers are reported from Ohio, eastern Indiana, northern and southern Illinois, south-central Iowa, southern Missouri, northern Arkansas, and northeastern Oklahoma. At the close of the year the situation apparently approaches that prevailing at the end of 1933, with a prospect of another outbreak in 1937. The accompanying map shows the abundance of chinch bugs in hibernation in the fall of 1936. In the central area local injury is likely, and, if spring weather favors the bug, general injury is anticipated. In the surrounding area local injury is likely if the weather favors the bugs. This summary is based principally on information supplied by the State entomologists of the States concerned and on supplementary data from the stations of the Bureau of Entomology and Plant Quarantine in the States. (C. M. Packard, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

HESSIAN FLY

The severity of the widespread outbreak of the hessian fly in progress of development in the fall of 1935 was considerably moderated by subsequent weather conditions unfavorable to fly activity. The unusually heavy late fall brood a year ago suffered considerable winter mortality. Unfavorable weather conditions last spring at critical times during the development of the spring brood checked the progress

of the outbreak. Nevertheless, from moderate-to-severe spring infestations developed throughout a rather large area extending from east-central Missouri through central and southern Illinois, widening to include most of western Indiana and narrowing again to continue across southern Indiana into southwestern Ohio. Light-to-moderate infestations also occurred in some localities of southern Michigan, east-central Ohio, and north-central Pennsylvania. The most severely infested area included southern Illinois, southern Indiana, and southwestern Ohio. In this area most of the fields observed were injured to some extent and much fallen straw was in evidence. A conservative estimate of damage to the 1936 crop places the loss in Illinois, Indiana, and Ohio at 6,878,000 bushels, or about 6 percent of the crop, with a value of $6,521,000 at current prices. At harvest time a severe fall outbreak extending from eastern Missouri to southwestern Ohio threatened, with practically no danger of such an occurrence in the west-central, southern, or eastern States, except for restricted areas in southern Michigan, eastern Ohio, and central Pennsylvania. However, the summer drought caused unusually high mortality of aestivating puparia, and fall weather conditions were rather unfavorable to fly activity or early sowing of wheat. Moderate fall infestations are present in volunteer and in occasional early sown fields in some localities throughout the Central States but reports from most of these States indicate that generally wheat was sown late and fly infestations are in general very light, with little prospect of material injury to the crop next spring, except in occasional fields. This summary is based on observations and surveys by the Bureau of Entomology and Plant Quarantine and the entomologists of the States concerned. (C. M. Packard, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BLACK GRAIN STEM SAWFLY

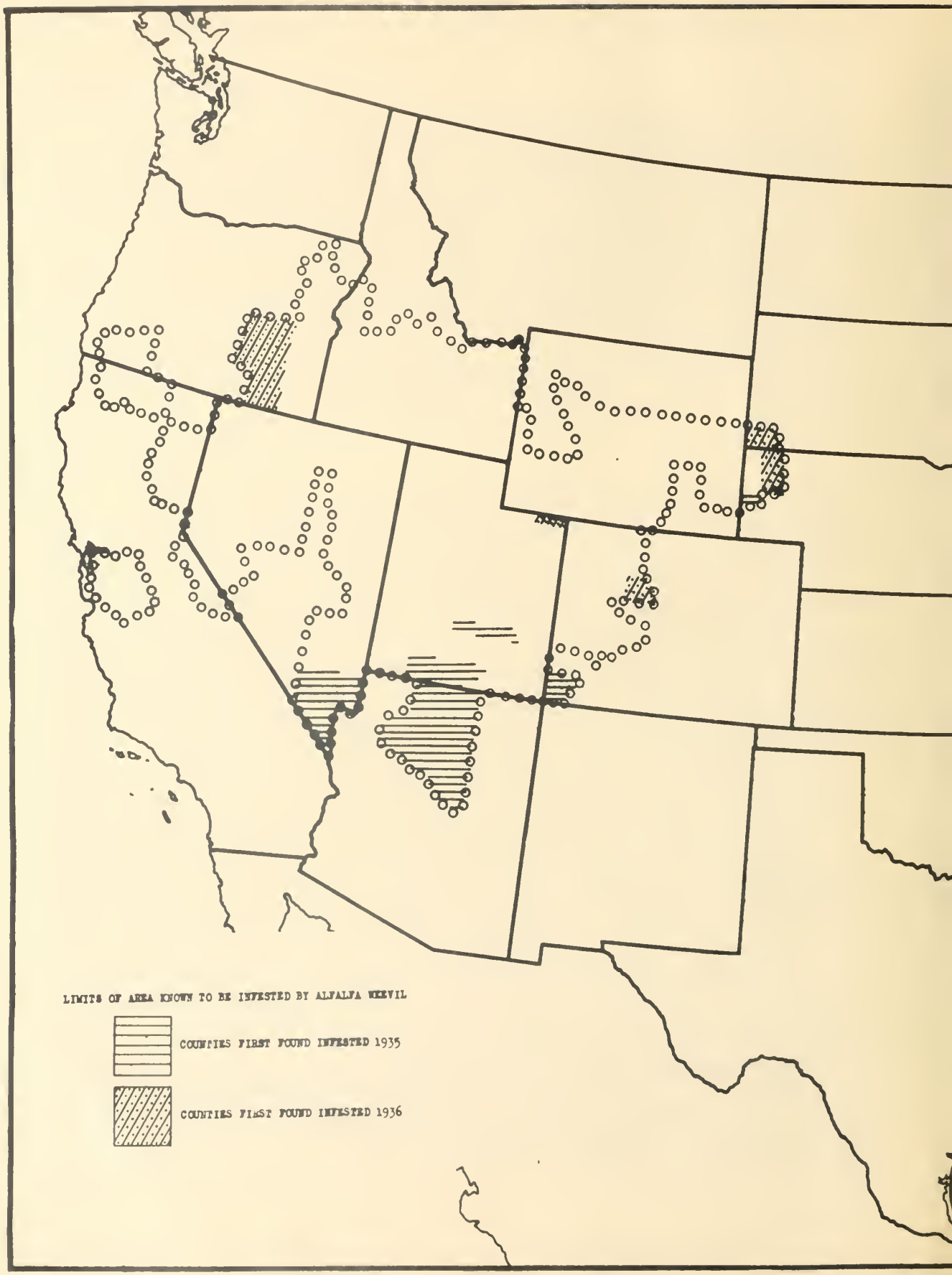
Surveys made during the summer showed the black grain-stem sawfly more or less abundant in wheat fields over a wide area. Infestations were found in Kent and New Castle Counties, Del.; Baltimore Carroll, Cecil, Dorchester, Frederick, Montgomery, and Washington Counties, Md.; and in Adams, Butler, Centre, Cumberland, Franklin, Huntingdon, Indiana, Lycoming, Mercer, Mifflin, Northumberland, Perry, Union, and York Counties, Pa.; Augusta, Campbell, Caroline, Fauquier, King George, Loudoun, Prince William, Rockingham, Shenandoah, and Westmoreland Counties, Va.; and in Belmont, Carroll, Columbiana, Coshocton, Guernsey, Harrison, Holmes, Jefferson, Mahoning, Medina, Monroe, Noble, Portage, Stark, Summit, Trumbull, Tuscarawas, and Wayne Counties, Ohio. The infestation was by far the heaviest in eastern Ohio, where numbers were alarming in several counties. The infestation was found to have advanced considerably farther westward in that State this year. (E. J. Udine, Bureau of Entomology and Plant Quarantine, and J. S. Houser, Ohio Experiment Station.)

EUROPEAN WHEAT MIDGE

A survey of the European wheat midge (Thecodiplosis mosellana Gehin) in western Washington was made in July. The survey extended the known infested area to Puyallup, in Pierce County, nearly 50 miles south of any previously known infestation. A number of heavily infested fields were found in the older infested district near Burlington, in Skagit County. In one field of spring-sown wheat it was estimated that over 50 percent of the wheat kernels had been destroyed. The infestation in Snohomish, King, and Pierce Counties was very light. The insect has spread through Snohomish and King Counties into Pierce County, notwithstanding the scarcity of wheat. In some places the small wheat fields are 18 miles apart. South of Puyallup conditions are more suitable for rapid spread of infestation. (M. M. Roeher, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

MORMON CRICKET

The mormon cricket outbreak in 1936 was as severe as, or worse than, in 1935. Some reductions in size and intensity of infestations were noted in Montana, Idaho, and Washington, but these were more than offset by increases in the other States. In addition to the eight States infested in 1935, small infestations were reported in California, North Dakota, and South Dakota. Considerable damage to crops was recorded in most of the States affected, although the losses were smaller in States where control work was carried on. Montana, where little or no control work was done, showed an estimated loss in grain for the Crow Indian Reservation alone of $200,000. Utah reported losses to cattle range and crops of $64,000 and Nevada, where a thorough control program was carried out, reported only $1,000 loss to crops, with a saving of $250,000, although damage to the range in some sections was quite severe. The crop losses reported in Washington and Idaho were also very low, compared to what they might have been had no control work been carried on. No estimates were made for Wyoming, Oregon, or Colorado. Only three States -- Idaho, Nevada, and Washington -- put on control campaigns in 1936. These were financed, for the most part, by W. P. A., E. C. W., and State funds. A total of 103,600 acres of cricket-infested land was treated in the three States, as follows: Idaho, 40,000; Nevada, 61,000; and Washington, 2,600. In addition, 11 miles of barrier were used in Idaho and 24 miles in Nevada. It was estimated that 300,000 bushels of crickets were trapped and destroyed in the latter State. From estimates submitted by the entomologists of the various States affected the following acreages were found to be infested in 1936: California, 40,000 (?); Colorado, 440,000; Idaho, 1,295,580; Montana, 1,029,000; Nevada, 1,142,768; Oregon, 164,700; Utah, 504,500; Washington, 135,000; Wyoming, 856,196; total 5,607,744. (F. T. Cowan, Bureau of Entomology and Plant Quarantine, U. S. D. A.)


LIMITS OF AREA KNOWN TO BE INFESTED BY ALFALFA WEEVIL
COUNTIES FIRST FOUND INFESTED 1935
COUNTIES FIRST FOUND INFESTED 1936

ALFALFA WEEVIL

Surveys of major alfalfa districts within the weevil-infested territory showed the 1936 season opening with Box Elder, Salt Lake, and Sevier Counties, in Utah, and Washoe County, Nev., having one-fifth or less of the alfalfa fields with potentially injurious populations of adult weevils, while one-third of the fields in Jackson County, Oreg., and three-fourths of those in Mesa County, Colo., had destructive weevil populations. Spring weather conditions allowed the alfalfa crop to mature before the weevil attack developed, except in western Colorado. In other regions, threatening weather late in May and early in June delayed the first harvest, permitting damage that otherwise would not have occurred. Serious damage occurred only in Western Colorado, southwestern Oregon, and in a small tract, Eagle Valley, in Baker County, Oreg. Damage in Utah was light and somewhat below normal, occurring in Salt Lake, Box Elder, and Millard Counties. Slight damage was reported from Douglas, Lander, and Elko Counties, Nev. One field in Sioux County, Nebr., suffered severe damage. No damage occurred in infested regions of California and Wyoming. Surveys this fall show the majority of fields to have subnormal adult weevil populations in all districts except Mesa County, Colo., where three out of four fields are menaced. Other regions likely to experience damage in from 10 to 25 percent of the alfalfa fields in 1937 include the district comprising Delta and Montrose Counties, Colo., the Upper Snake River Valley of eastern Idaho, Box Elder County, Salt Lake County, and the district of Sevier and Sanpete Counties in Utah, Jackson County, Oreg., and Douglas County, Nev. This outlook is, of course, subject to modification by the weather next spring. Scouting during the summer resulted in new records of infestation in six counties distributed among five States; namely, Eagle County, Colo., Dawes and Box Butte Counties, Nebr., Harney County, Oreg., Dagget County, Utah, and Fall River County, S. Dak. (the first infestation record in South Dakota). The accompanying map shows the present known limits of alfalfa weevil occurrence in the United States, and indicates the areas discovered as having been infested within the past two years. (J. C. Hamlin, R. W. Bunn, and W. C. McDuffie, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

VETCH BRUCHID

This summer Bruchus brachialis Fahr. was found heavily infesting vetch seed in the following counties in North Carolina: Alexander, Anson, Catawba, Cabarrus, Davidson, Davie, Forsyth, Gaston, Guilford, Iredell, Lincoln, Mecklenburg, Montgomery, Randolph, Rowan, Richmond, Stanly, Union, and Yadkin. The records of infestation in Alexander, Anson, Montgomery, and Richmond are new areas of infestation recorded this year. Percentage of infestation in all fields ran at least 50 percent, with maximums as high as 90 percent. During the year J. S. Pinkney reared two hymenopterous parasites from the vetch bruchid Lariophagus distinguendus (Forst.)(det. A. B. Gahan), heretofore not known to attack this insect, and Bruchebdus mayri (Masi)(det. A. B. Gahan), a European species not previously known to occur in North America.

CODLING MOTH

The codling moth, which was very much reduced in numbers at the beginning of the 1936 season in the Middle West and East because of unfavorable conditions in 1935, as well as heavy winter mortality in certain Midwestern States, staged a very rapid comeback in many orchards east of the Rocky Mountains. Some localities reported the worst infestation in years, the later broods being abnormally large. In Nebraska, Kansas, and Iowa, however, there was some repression during the drought period, apparently because of the excessive heat and dryness. In the Rocky Mountain States and the Northwest the winter mortality was reported as low. The infestations in most of these western areas were in general about normal. Exceptions to this condition were reported in Montana. (B. A. Porter, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ORIENTAL FRUIT MOTH

The oriental fruit moth was on the whole less abundant and destructive than usual. Infestation generally lighter than normal was reported from Georgia, Maryland, Mississippi, South Carolina, Tennessee, and Virginia. Illinois reported general presence of this moth in the southern part of the State, but in reduced numbers, with early hot weather repressing the species. About the same condition was noted in Southern Indiana and Kentucky. Light infestations, with some twig injury but little fruit injury, were observed in Arkansas, Massachusetts, northern Indiana, Michigan, and Pennsylvania. Somewhat heavier infestation than usual was noted from Missouri (southeastern part early in season) and Ohio (northern part), and parts of New Jersey. Variable

infestation was reported from Connecticut, some fruit injury near New Haven being reported late in the season. Activity of the species was noted briefly in New York and Alabama. The insect was widely reported as active early in the season. Delaware reported the first emergence on April 5, adults were active in Virginia in April, and New Jersey noted activity earlier than last year. The first brood was reported as more noticeable than were later broods in parts of Connecticut, in Illinois, and in Kentucky; the second brood as the more noticeable in Michigan, New Jersey, Ohio, and Virginia. Delaware reported parasitization as low at the start, but building up as the season advanced. (F. M. Wadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

PLUM CURCULIO

The plum curculio was not unusually abundant in 1936. In the Southeastern States it was in general less abundant than normal, being so reported from Mississippi, Tennessee, South Carolina, and Georgia. In the last-named State it was noted as getting a late start in its spring activity. It was also less abundant in Ohio and Delaware. In lower New England it was more abundant than usual, according to reports from Rhode Island and Connecticut. In New York numbers were reported as varying with locality. In the Middle West, according to reports from Indiana, Illinois, and Missouri, the species was numerous and active at the start, but did not attract attention later in the season. The unusual drought and heat probably repressed it. The presence or activity of the species was also noted, without comparisons, from Alabama, Maryland, Michigan, Minnesota, New Jersey, Pennsylvania, Vermont, and Virginia. (F. M. Wadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

EASTERN TENT CATERPILLAR

Although egg masses of the eastern tent caterpillar were prevalent throughout New England and the Middle Atlantic States, there was evidence that the outbreak of the last 2 or 3 years is on the wane. Hatching of eggs was first observed about the middle of March in Arkansas and towards the end of the month in Delaware. Early in April eggs were hatching in the extreme southern part of New York and by the third week in April hatching was under way in New England. The caterpillars attracted so much attention in the New England and Middle Atlantic States that several communities launched campaigns in which prizes were awarded to school children, boy scouts, and other juvenile organizations for collecting egg masses. The Survey has not been informed as to how successful these campaigns were in reducing the number of caterpillars. As the season advanced the insects were quite prevalent throughout the outbreak area, but their numbers bore out the forecast of decided reduction in population over that of 1935.

FRUIT FLIES

Through the use of traps set in the uncultivated lands of northern Mexico, data were accumulated during 1935-36 which greatly strengthened the theory that Anastrepha ludens Loew is a rather migratory species. Flies were trapped in locations many miles from any known wild or cultivated host and in an arid country that probably would not sustain a growing fly population throughout the year. The recurring infestations in the Rio Grande Valley probably result from flies that have reached this area from Mexico. It is believed that most of the flies trapped in northern Mexico and Texas originated in the heavily infested area about 125 miles south of the border. There is growing along the mountains of northern Mexico a favorite host, Sargentia greggii, which fruits in the summer. Apparently adults leave this host when the fruit is gone late in the summer and at least part of them migrate northward in search of food and fruit for oviposition. Some of them eventually reach the Rio Grande Valley. The same conditions, apparently, that cause the flies to immigrate into the valley during the fall also force them to emigrate during the spring. When the fruit is removed from the trees during the harvesting season, the flies seem to leave the harvested grove also, and when the host-free period is in effect no flies are trapped in the valley. The trend of migration seems to continue northward, as flies are regularly trapped in the brush north of the valley late in the season.

BOLL WEEVIL

The damage caused by the boll weevil in 1936 was probably less than it has ever been in any year since it became widely distributed over the Cotton Belt. The only areas that suffered more than normal damage were the eastern and southern parts of Texas. The light damage in 1936 was caused by a combination of factors. The weevils entering hibernation in the fall of 1935 were more numerous than usual in South Carolina and eastern Texas but less so than usual in Mississippi, Louisiana, and Oklahoma. The abnormally low winter temperatures caused a heavy mortality and the lowest survival in the hibernation cages ever recorded at Florence, S. C., and no survival at Eufaula, Okla. The survival at Tallulah, La., was also much less than normal but at College Station, Tex., it was several times higher than usual. The generally low survival over most of the Cotton Belt was followed by a very dry spring, with extremely high temperatures in May and June, which further reduced the number of weevils, except in eastern Texas. The drought was more prolonged in Oklahoma, where only 2.11 inches of rain fell in the 99 days from June 8 to September 14, and the weevil infestation was practically wiped out. At Tallulah, La., approximately 90 percent of the grubs in the infested squares were killed by climatic conditions during the latter part of June. As a result of the low survival and climatic control, the infestation did not build up to the

damage point until very late in the season and in many sections no control measures were necessary. Very little dusting was necessary for boll weevil control in the Delta district, where c ntral is nearly always necessary. The exception to the above conditions was in eastern and southern Texas, where a high survival was followed by an excessively wet spring and summer, and the weevil damage was the most severe in many years. This low weevil population over most of the Cotton Belt was followed by an early and widespread infestation of leaf worms, which defoliated the cotton early and further reduced the weevil population that entered hibernation in the fall. (U. C. Loftin, Bureau of Entomology and Plant Quarantine, U.S.D.A.)

PINK BOLLWORM

The most outstanding events in connection with gin-trash inspection of the 1936 cotton crop were the finding of a new infestation of the pink bollworm in the lower Rio Grande Valley of Texas and the continued absence of infestation in the regulated part of Florida. This is the second consecutive crop season in which no infestation was found in Florida. The new infestation in Texas is apparently very light and involves four counties -- Cameron, Hidalgo, Starr, and Willacy. In the Plains counties of Texas, known as the Western Extension, infestation was found again this season. The last previous infestation in this area was in the 1934 crop, and in two of the counties involved no infestation had been found since the 1927 crop. For the past several years only sufficient inspection has been done in the older regulated areas to confirm infestation each year, and this practice was again followed. The counties involved are Graham and Greenlee, in Arizona; Dona Ana, Chaves, and Eddy, in New Mexico; and El Paso, Hudspeth, Pecos, Reeves, Ward, Presidio, and Brewster, in Texas. In these areas it is not practicable under existing conditions to attempt eradication and, therefore, only control measures have been enforced. In Brewster and Presidio Counties and the southwestern portion of Hudspeth County, Tex., a considerable number of worms are present and a small amount of commercial damage is done, but in the remaining counties infestation has always been so light that no commercial damage has ever resulted. (R. E. McDonald, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

COTTON LEAF WORM

As in 1935, the cotton leaf worm appeared early and was widely distributed in 1936. The first recorded appearance of the leaf worms this year was in Calhoun county, Tex., on May 5. Spreading northward and eastward, it was reported from College Station, Tex., on July 15; Louisiana, Arkansas, and Tennessee, on July 15 to 17; State College, Miss., on July 27; Stoneville, Miss., on July 30; Florence, S. C., on August 2; Tucson, Ariz., on August 12; and from Tifton, Ga., on August 14. Moths at lights were reported from Michigan on August 22, also from Connecticut on September 23, and from Maine on September 9.

During September and October worms were reported from all the cotton States except California, and moths were reported as abundant in the Northern States and Canada. The spread was more rapid and in general the infestation was more severe than last year. Poisoning was necessary as early as the first week in June in Southern Texas. Control measures were necessary in some fields in all parts of the main Cotton Belt and as far north and west as Missouri and Arizona. More poison was used for leaf worms than for boll weevils in the Delta. Unprotected fields were generally stripped during the latter part of July and August; however, the extremely dry and hot weather had caused early maturity of the cotton and concentration of worms on the younger fields so that a large part of the crop was matured before it was damaged. The general early defoliation of the plants stopped the late production of squares and bolls and greatly reduced the number of boll weevils entering hibernation. Although the leaf worm infestation was early and heavy and necessitated the expenditure of large sums of money for the protection of the immature crop, most of the fields that needed protection were poisoned and the actual damage caused was comparatively small. (U. C. Loftin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

COTTON FLEA HOPPER

The peak of the emergence of the cotton flea hopper from overwintered eggs in southern Texas occurred at the end of April in 1936, or about 3 weeks later than normally. The total emergence from croton plants in hibernation cages was about 20 percent greater this year than in 1934 or 1935; however, the field population was much lower than in those years, and for the first time in 4 years did not reach the point where control measures were needed in May. The principal factor responsible for the low field population in this section, where damage is usually great, was the excessively heavy rainfall, which killed great numbers of the newly hatched nymphs and caused an abundant growth of horsemint and other weeds on which the hoppers fed, delaying migration to the cotton fields. The light migration and infestation was shown by the lowest catch on the trap screens in several years. Although the field population increased somewhat during June, it never became high. Rains continued during the latter part of June and throughout July, the most important fruiting season of the cotton, and the excess moisture caused abnormal shedding of bolls and squares. The cotton did not react and produce a top crop, and the yields per acre and gains from the flea hopper control experiments were very low. In other sections of the Cotton Belt the damage caused by flea hoppers was normal, except in the Coastal Plains where damage was somewhat heavier than usual. In the Mississippi-Louisiana Delta Lygus pratensis (L.) and Adelphocoris rapidus (Say) caused more than average damage and considerably more than the flea hopper. (U. C. Loftin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

MEALYBUGS

While apparently not markedly injurious, a concentration of mealybugs (Phenacoccus cevalliae Ckll.)(Det. H. Morrison) on cotton in the Peoria, Ariz., district is of interest, on account of its novelty. Several reports were received during the midsummer months of small areas of cotton north of Phoenix having a heavy infestation of mealybugs. One of those areas was investigated on August 21. The field visited is located about ½ mile north of Peoria. Several hundred cotton stalks were found to be heavily infested, some of the terminal twigs being encrusted several insects deep. The field was again visited on September 19, at which time it was found that the number of mealybugs had greatly decreased, with perhaps about only 10 percent present, as compared to the numbers observed on the occasion of the first visit in August. The field had been picked in the meantime and the number of burrs and bolls on the infested stalks showed little appreciable difference from those in the remainder of the field, indicating that little material damage had been inflicted by the infestation. (T. P. Cassidy, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

THRIPS

More reports of damage to cotton by thrips were received during 1936 than for the past several years. The extremely dry season, with the resultant poor stands and reduced vitality of plants, were contributing factors to the damage caused, as well as to the unusually large thrips population. The most extensive damage occurred in the South Atlantic States, although reports of serious local injury were received from most of the Cotton Belt. In northeastern Alabama most of the cotton in an entire county was practically defoliated during the latter part of June. At least 12 species of thrips were collected on cotton, the abundance and importance of the different species varying in different sections. Frankliniella fusca (Hinds) was reported from South Carolina, Alabama, and Mississippi; F. tritici (Fitch) from South Carolina and Mississippi; F. runneri Morg. from Mississippi; F. occidentalis Perg. from Arizona; F. gossypii Morg. from Texas; Sericothrips variabilis Bach. from South Carolina, Alabama, and Mississippi; Thrips tabaci Lind. from South Carolina and Alabama; Thrips panicus Moult. from South Carolina; Heliothrips fasciatus Perg. from California; Pseudothrips sp. from Alabama; and Acolothrips duvali Moult. from Texas. (U. C. Loftin, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

MEXICAN BEAN BEETLE

The 1936 season was, on the whole, below average for the Mexican bean beetle east of the Mississippi River. Extremely high temperatures and drought checked development in many parts of the Eastern and Southern States. In the Ohio Valley the infestations were lighter than average, owing to low winter survival and unfavorable spring and summer weather. Late in the summer and in the fall the weather was favorable to development and a considerable number of the beetles entered hibernation. Along the Atlantic seaboard and the Chesapeake Bay survival over winter was somewhat below average, development was about average, and much damage was done to untreated bean crops, especially in Maryland and Virginia. In Delaware damage was below average. The infested area of New England suffered about average damage. Reports from Tennessee indicate a light infestation. Reports from Alabama and Georgia indicate that the increase late in the summer made control measures necessary. The capture of a Mexican bean beetle adult in a Japanese beetle trap in St. Louis indicates that the beetle is present in Missouri, which is the only hitherto uninfested State invaded in 1936. Reports of extension of infested territory include Lauderdale and Lamar Counties, Miss., and the Charleston, S. C., district. At Grand Junction, Colo., the infestation was about average, necessitating control measures. According to reports, the beetle was abundant in northern Colorado. In the Estancia Valley, N. Mex., the infestation was probably below average. (N. F. Howard, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BEET LEAFHOPPER

The beet leafhopper situation during 1936 was very favorable. Little or no damage to beets occurred in the most important beet-growing sections of the country. Late in March the insects appeared in numbers in southern Texas and the early spinach crop was considerably damaged by curly top. Late in April there was a heavy infestation in Fresno County, Calif. One of the interesting observations of the year was the discovery that the hoppers survive the winter in the Billings, Mont., beet district, and also in Tooele County, Utah. About the middle of October the first fall adults were taken in southern Texas.

CUTWORMS

During March and April reports were received from Kansas, Oklahoma, and Colorado, of more or less serious damage to wheat and alfalfa by the army cutworm, and early in March considerable damage was done to lettuce, melons, and other vegetables by the black cutworm in Arizona. About the middle of April considerable damage was done by cutworms to young cotton in parts of Texas and to grapes in California. In May cutworm damage was reported from a wide area from Virginia to Georgia on the Atlantic coast, westward to Iowa and Nebraska, many species of cutworms being involved. In Montana the pale western cutworm was

reported as more destructive than any year since 1932. In western Kansas many counties reported severe damage, 20,000 acres of wheat being destroyed in Rawlins County. Utah reported 7,500 acres of wheat destroyed in one county. Considerable damage to cereal crops was also reported from western North Dakota. The variegated cutworm was very destructive in the Mississippi Delta.

A WEEVIL

Late in June adults of Calomycterus setarius Roelofs began to appear in the known infested territory in the towns of Stratford and Sharon in Connecticut, and at Towson, Md. In Connecticut in July the adults, more numerous than in 1935, were feeding on lespedeza, desmodium, and other legumes, and in Maryland on alfalfa. A new infestation was discovered this year at Fairfield, Conn., where the adults were feeding on clover.

PERIODICAL CICADA

Breed X of the periodical cicada occurred this year in enormous numbers over the infested territory. A complete account of this insect, together with maps of Broods X and XXII, which were to occur in 1936, was published as series E-364, December 1935. In the following report of recorded occurrences in 1936, the names of counties are underscored.

Occurrence of Brood X:

Alabama: Geneva, Geneva.

Delaware: New Castle, Chestnut Hill, Iron Hill, Wilmington.

Georgia: Fannin, Blue Ridge; Habersham, Cornelia; Meriwether; Murray, Chatsworth; Rabun, Clayton; Talbot.

Illinois: Vermilion, Danville.

Indiana: Knox, Bicknell; Orange, Orleans; Tippecanoe, LaFayette; Warrick, Elberfeld; Wayne, Hagerstown, Richmond.

Maryland: District of Columbia; Allegany, Cumberland; Baltimore, Baltimore, Texas, Timonium, Towson; Cecil, Conowingo Dam, Elkton, North East, Perryville, Red Point; Frederick, Lewiston; Howard, Florence; Montgomery, Ashton, Avanel, Avery, Bethesda, Chevy Chase, Gaithersburg, Glenmont, Norbeck, Rockville, Sandy Spring, Silver Spring, Somerset, Takoma Park, Wheaton; Prince Georges, Beltsville, Hyattsville, Laurel, Mount Rainier; Washington, Fairview; Hancock.

Michigan: Calhoun, Albion; Cass, Cassopolis; Genesee, Grand Blanc; Kalamazoo, Kalamazoo; Lenawee, Adrian, Tecumseh; Saint Joseph, Lakeport Township; Van Buren, South Haven; Washtenaw, Ann Arbor.

Missouri: Dunklin, Campbell, Malden.

New Jersey: Essex, Hillside, Newark; Mercer, Glen Moore, Hopewell, Princeton; Morris, Lincoln Park.

New York: Erie, Buffalo; Nassau, Farmingdale, Massapequa;. Richmond; Suffolk, Babylon, Brightwaters, Deer Park, Lindenhurst, Mastic, North Babylon.

North Carolina: McDowell, Old Fort; Wilkes.

Ohio: Allen; Auglaize; Brown; Butler; Champaign, Urbana; Clark, Springfield; Clermont; Clinton; Crawford, North Robinson; Darke; Delaware, Delaware; Fairfield, Bloom Township; Fayette, Washington (Court House); Franklin, Columbus, Grandview Heights, Upper Arlington; Gallia, Greene, Clifton; Guernsey; Hamilton, California, Cincinnati, Mount Airy, Mount Washington; Hancock; Hardin; Logan, Bellefontaine; Madison;Marion; Mercer; Miami; Montgomery; Dayton; Pickaway, Derby, South Bloomfield, Williamsport; Preble; Shelby, Kettlersville; Union, Milford Center; Van Wert; Warren; Wyandot.

Pennsylvania: Adams, Aspers, Biglersville; Armstrong, Mahoning Township; Bedford, Bedford Township, Defiance, Lincoln Township; Schellsburg; Berks, Bechtelsville, Birdsboro, Brecknock Township, District Township, Hill Church, Landis Store, Mertztown, Morgantown, Mount Penn, Reading, Wernersville; Blair; Bucks, Danboro, Dublin, Hilltown Township, Mechanicsville, Ottsville, Pipersville; Butler; Cameron, Emporium; Carbon, Franklin Township, Laurence Township, Lehighton, Lehigh Township; Centre, Powelton; Chester, Avondale, Barnston, Brandywine Manor, Castle Rock, Chester Springs, Chesterville, Chrome, Clenwell, Coatesville, Cochranville, Compass, Doe Run,Downingtown, Elverson, Exton, Glen Moore, Gum Tree, Kemblesville, Kennett Square, Kimberton, King of Prussia, Landenburg, Lewisville, Lincoln University, Lionville, London Grove, McCorkles Rocks, Marshallton, Norristown, Nottingham, Paoli, Parkersburg, Peacedale, Phoenixville, Rosedale, Sadsburyville, Tanguy,Thorndale, Toughkenamon, Valley Forge, Walnut Hill, Warwick, West Chester, West Grove, Westtown, White Horse, Whitford, Willistown, Wyebrooke; Clearfield; Clinton; Columbia; Cumberland, Carlisle, Shippensburg; Dauphin, Halifax Township, Middle Paxton Township, Swatara Station; Delaware, Bethel Township, Castle Rock,Chelsea, Chester, Chester Heights, Concordville, Elam, Media, Newton Square, Radnor, Springton, Twin Bridges, Upland; Fayette, Charlestown; Franklin, Antrim Township,Chambersburg, Mason and Dixon (on Conococheaque Creek), Roxybury, Saint Thomas, Spring Run; Fulton, Bethel Township, Union Township; Greene, Jefferson Township;

Huntingdon, Hopewell Township, Huntingdon, Logan Township, Shade Gap, Shade Township, Todd Township; Jefferson, Ringgold Township; Juniata, East Waterford, Nook; Lancaster, Aberdeen Station, Bart, Christiana, Elizabethtown, Gap, Holtwood Dam, Pequea, Quarryville, Safe Harbor Dam; Lawrence, North Beaver Township; Lebanon, Mount Gretna, South Armville Township; Lehigh; Luzerne; Lycoming, Anthony Township, Jersey Shore; Mifflin, Lewistown, Oliver Township; Montgomery, Bryn Mawr, Limerick Township, Pennsburg, Pottstown, Schwenkville, Spring Mount; Montour, Northampton; Northumberland, Lower Mahony Township; Perry, Juniata Township, Loysville; Potter; Schuykill; Snyder; Somerset; Union; Westmoreland, Madison; York, East Hopewell Township, Etters, Hellam, Loganville, Pigeon Hills, Strinestown, York, Zions View.

Tennessee: Carter; Hamilton, Signal Mount, Soddy; Johnson; Knox, Knoxville, Mascot; Loudon; Rhea; Roane; Washington, Johnson City.

Virginia: Alexandria (Independent City); Charlottesville (Independent City); Arlington, Cherrydale, Clarendon; Clark; Fairfax, Falls Church; Frederick, Winchester; Loudoun, Leesburg; Prince William, Dumfries.

West Virginia: Berkeley, Martinsburg; Jefferson.

Occurrence of Brood XII in 1936

Arkansas: Crittenden, Bridge Junction; Faulkner, Palarn; Little River, Ogden; Miller (near Fulton, Hempstead County).

Louisiana: East Baton Rouge, Baton Rouge.

Mississippi: Adams; Oktibbeha, State College; Warren, Vicksburg.

CANKERWORMS

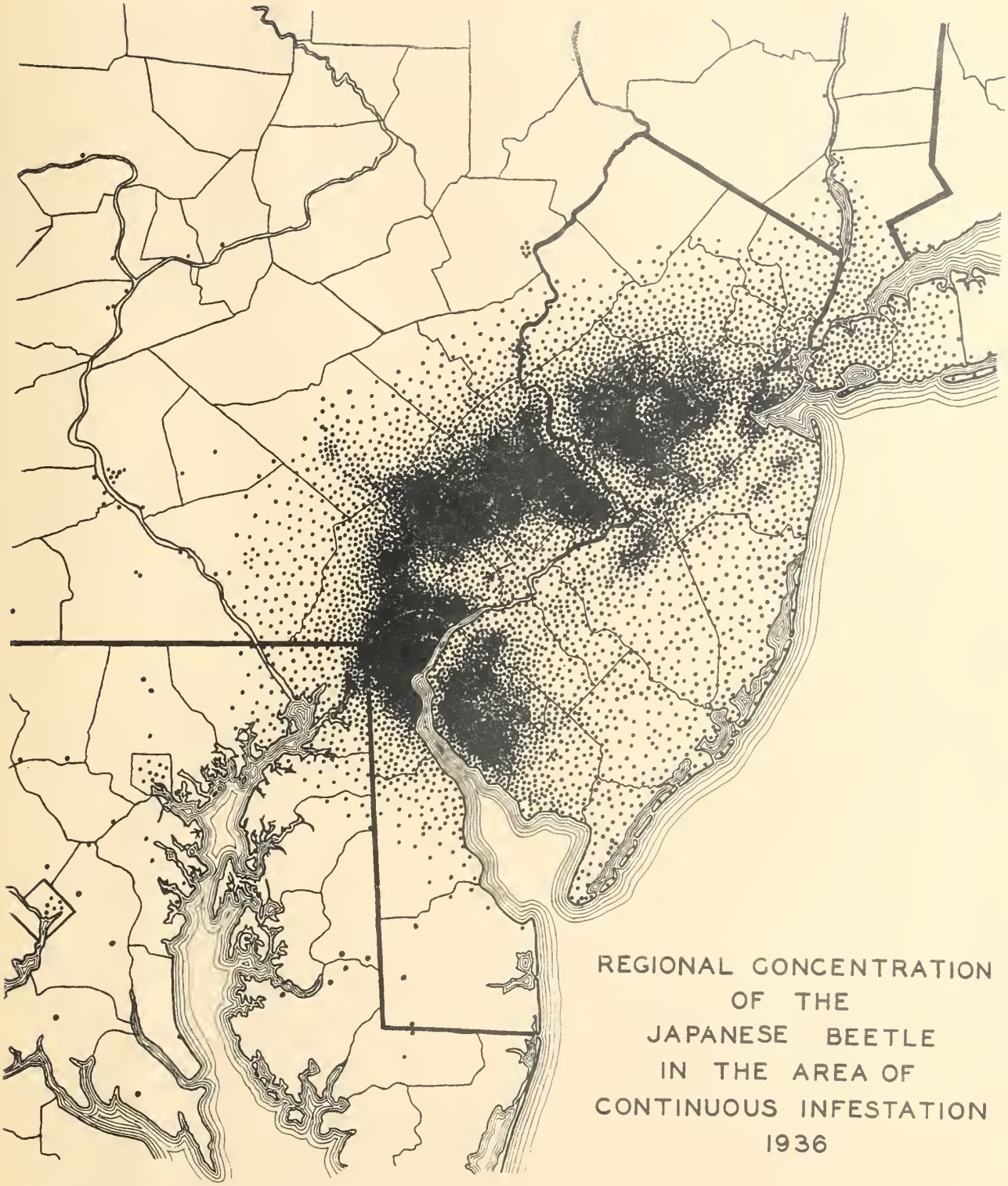
Cankerworm eggs began hatching in the East in May and in the Southern States early in March. Serious damage to both orchards and forest trees was reported from New England, the Middle Atlantic States, and the East Central States. In June considerable defoliation took place locally in Western Maine, Massachusetts, eastern New York, northern New Jersey, and northeastern Pennsylvania. Other infestations appeared in eastern Ohio, northern Indiana, and Illinois, extending into Wisconsin, Minnesota, Iowa, and Nebraska.

FOREST TENT CATERPILLAR

Late in April a very heavy infestation of this insect occurred in southern Mississippi, where, in many areas, sweetgum and oak were completely defoliated. As the season advanced reports of serious damage were received from Utah and Washington, and in June almost unprecedented outbreaks occurred throughout New England and New York. One defoliated area in the State of Maine included 60,000 acres of mixed timber. Throughout the East damage was particularly severe on sugar maple and elm. The outbreak extended westward over northern Michigan into Minnesota.

JAPANESE BEETLE

Insofar as the status of the Japanese beetle in the area of general or continuous infestation is concerned, the year 1936 is notable in several ways. For the first time since the beetle has been known to occur in the United States, there was a very considerable mortality of the grubs, resulting from the extreme cold weather in January and February, coupled with the lack of a sufficient blanket of snow covering the ground. Heavy larval mortality occurred in parts of southwestern New Jersey, the southeastern corner of Pennsylvania, northern Delaware, and in the northeastern corner of Maryland, the destruction of grubs in this area ranging from a few to as high as 80 percent. During previous winters, grub mortalities have seldom run higher than 10 percent throughout this area. Throughout other portions of the area of continuous infestation, however, larval mortality, in general, did not run appreciably higher than the average of previous years. As a consequence of the reduction in grub population late in the winter, there was observed during the summer beetle season a general decrease in both beetle abundance and plant injury in the same portions of New Jersey, Pennsylvania, Delaware, and Maryland, with some localized points of heavy beetle abundance and plant injury where winter conditions were more favorable. On the other hand, throughout those parts of the area of general infestation lying outside this restricted area, there was observed the customary general increase in beetle abundance and plant injury which was anticipated. This increased abundance and injury was particularly notable in sections north and northwest of Trenton and in parts of Salem and Cumberland Counties, in New Jersey; in New Castle County, south of Wilmington,



REGIONAL CONCENTRATION
OF THE
JAPANESE BEETLE
IN THE AREA OF
CONTINUOUS INFESTATION
1936

Del.; in small areas east of Elkton, Md.; and in sections in Chester, Berks, Montgomery, and Bucks Counties in Pennsylvania. Considerable increase in plant injury was also reported within the metropolitan area of New York City, both in New Jersey and in New York. The usual extension of the area of general infestation was observed, this area being extended outward in practically all directions for distances up to 5 miles or thereabouts. Observations at a number of the isolated colonies in New England indicated a decided increase in beetle population at practically all of these places. It is of interest to note that definite increases in beetle abundance were observed in 1936, as compared with 1935, at a number of points in Central New England that suffered severe property damage from the unprecedented floods of the winter of 1935 and spring of 1936. The flooding of valleys and portions of towns appeared to have no deleterious effect upon the overwintering grub populations at these points. In a considerable portion of the area of continuous infestation the summer rainfall of 1936 was below normal, this deficiency being quite acute in extensive tracts during the greater part of July and the early part of August, corresponding with the period of normal heavy oviposition. Based upon observations of past years, during which a marked deficiency of summer rainfall resulted in a reduction of the beetle population of the following season, it appears likely that a general reduction in the beetle population may occur in a large proportion of the area of general infestation in 1937, with the possible exception of the outlying areas where the population build-up is normally very rapid. (C. H. Hadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Established infestations in Brewer, Maine, Burlington, Vt., and Grafton, and Hollidays Cove, W. Va., were the most important first records determined during the summer of 1936. The major developments disclosed by trap scouting were the increases in beetle population in Chicago, Ill.; Cleveland, Youngstown, East Liverpool, Canton suburban area, Steubenville, and Marietta, Ohio; Buffalo, N.Y.; and Chester, Parkersburg, Clarksburg, and Fairmont, W. Va. Control programs of combined trapping and soil treatment resulted in more than 90-percent reduction in beetles caught in Saint Louis and substantial reductions in the infestations in Indianapolis, Ind., and Erie, Pa. Late treating in Detroit did not affect this year's emergence and the catches there were higher than last year. Trapping in Virginia and the Carolinas disclosed about the same conditions as in 1935. A slight increase in the infestation in Pulaski, Va., and reappearance of the insect in Charleston, S. C., were the only major finds over those recorded during 1935 in these States. Incipient infestations of a few beetles each were found in Louisville and Lexington, Ky.; Bristol, Tenn.; and Augusta and Savannah, Ga. Minor first record infestations were disclosed in Fort Wayne and South Bend, Ind.; Dearborn, Mich.; Lockport, N.Y.; and Sharon and Warren, Pa. A number of small catches of previous years were repeated in other cities and towns in North Carolina, West Virginia, Virginia, Ohio, and New York. Twentyfour infestations, including five sizable ones, were found in the Maryland nonregulated area. (L. H. Worthley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ASIATIC GARDEN BEETLE

No general surveys have been conducted during the year to determine the spread or abundance of the Asiatic garden beetle; however, observations in northern New Jersey during the spring of 1936 indicated a definite reduction in larval population at a number of points where adults were abundant in 1935. This condition was likewise observed at the colony center of this species in the Philadelphia district. Trap collections reported from northern New Jersey, observations in the Philadelphia district, and general correspondence indicated a decided reduction in the adult population and plant injury during the summer of 1936. (C. H. Hadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ORIENTAL BEETLE

Although no general survey was made during the year to check on the status of the oriental beetle, limited observations and correspondence indicated a reduction in this species in northern New Jersey. On the other hand, the beetle is reported to have caused considerable injury to turf in untreated lawns in the general vicinity of New Haven, Conn. The occurrence of this species was observed for the first time in Springfield, Mass., where large sections of turf on private grounds were severely injured by grubs. (C. H. Hadley, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SMALLER EUROPEAN ELM BARK BEETLE

Scouts searching for the Dutch elm disease in elms along the railroad rights-of-way through Northern West Virginia discovered an infestation of Scolytus multistriatus Marsham at Parkersburg, W. Va. By following river valleys, scouts found the beetle in an area roughly bounded by Wheeling, Glenville, and Charleston, W. Va.; and Ironton, Wellston, Athens, and McConnelsville, Ohio, comprising approximately 7,500 square miles. Intensive sampling of beetle-infested trees in the vicinity of Parkersburg and various other points throughout this area has failed to disclose any Dutch elm disease infections.

Cooperative trap-log experiments afforded a sampling of the population of this species throughout the territory known to be infected with the Dutch elm disease and the 10-mile protective band surrounding it. The area within an approximate radius of 50 miles of New York City, including all the major infected zone, was divided into blocks 4 miles square. Four elm logs were placed as nearly as possible in the center of each block. After approximately 4 weeks' exposure, the logs were collected from 456 blocks. S. multistriatus was found in logs from 89 blocks, rather widely scattered throughout the entire section trapped. The heaviest concentrations of this species, as disclosed by the trap logs, are in the vicinity of Somerville and Bound Brook, and Bernardsville, in Somerset County, Clinton

and Glen Gardner, Hunterdon County, and Norwood, Bergen County, N.J.; Ossining, Westchester County, and Salisbury Mills, Orange County, N.Y.; and Redding, Fairfield County, Conn. Beetles were taken in only 2 out of 50 blocks trapped in Pennsylvania. The positive finds in the latter State were in blocks a few miles west of Trenton. Recoveries were made from only 2 squares of 42 blocks comprising the rather limited trapped area on Long Island. Beetles were taken from scattered blocks along or near the periphery of the entire trapped zone. (L. H. Worthey, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

GYPSY MOTH

The hatch of gypsy moth egg clusters in the spring was quite variable, as the low temperatures during the winter of 1935 and 1936 caused the killing of quite a number of them. The killing temperatures, however, were not uniform in many sections of the infested areas, as a number of the exposed egg clusters in some localities hatched during the season. Egg clusters below the snow line showed a high percentage of hatch. During the summer a total of 428,622 acres of woodland was partially or totally defoliated.

In Maine there was a slight decrease in defoliation over 1935, and a considerable decrease in New Hampshire and Rhode Island. In Massachusetts the amount of defoliation increased considerably over that recorded for the season of 1935. This was due to the great increase in two of the counties in the southeastern section of the State, namely, Bristol and Norfolk Counties. In the former, over 45,000 acres were recorded as showing at least noticeable defoliation, whereas in 1935 only about 800 acres were recorded. In Norfolk County the total defoliation for 1936 was 13,000 acres, as compared to 45 acres in 1935.

With the exception of Massachusetts, defoliation in general over the entire area was considerably less than it was in 1935, though scattered towns showed increase.

In both Vermont and Connecticut no noticeable defoliation was recorded, whereas in 1935 several acres of noticeable defoliation were found in some localities in both of the States. (A. F. Burgess, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

BROWN-TAIL MOTH

During the fall and winter of 1935-36, brown-tail moth webs were cut over the infested area in Maine, New Hampshire, Massachusetts, and Rhode Island. In Maine, 1,256,085 brown-tail moth webs were cut and destroyed; in New Hampshire, 2,786,461; in Massachusetts, 629,767; and in Rhode Island a total of 306 were found in two towns in the eastern part of the State, this being the first infestation found in Rhode Island for a number of years. During the summer of 1936 there were no reports of extensive defoliation, although slight defoliation was noted in a few towns in northeastern Massachusetts. In Maine and New Hampshire no noticeable defoliation was noted during the season of 1936. In late summer a number of winter webs were noted in southern Maine, southern New Hampshire, and northeastern Massachusetts. (A. F. Burgess, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SATIN MOTH

In some sections of the infested area in New England, records made during the summer of 1936 indicated that the satin moth is increasing quite rapidly. Although no extensive areas of defoliation were noted, heavy feeding was noted in southern Maine, southeastern and central New Hampshire, eastern Massachusetts, and near Bridgeport in southwestern Connecticut. In Rhode Island some of the towns were generally infested, but no areas of noticeable defoliation were noted and no increase over the degree of infestation in 1935 was noted. (A. F. Burgess, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

SCREWWORM

By November 13 a total of 43,206 cases of screwworms and maggots was reported in the Southeastern States and were distributed as follows: Alabama, 507; Florida, 39,912; Georgia, 2,116; Louisiana, 255; Mississippi, 297; and South Carolina, 119. In Georgia most of the cases were reported from the southern counties during the autumn months. Of 39,912 cases reported from Florida from January 1 to November 13, 21,992 cases occurred during the months of June, July, August, September, and October, the period when screwworms would normally be most prevalent. Cases were widely distributed in the State throughout the year but were not permitted to cause an outbreak in any locality. From June 19 to the 13th of November, 126,380 cases of screwworms and maggots were reported from the Southwestern States, of which 102,429 occurred in Texas; 21,269 in New Mexico; 942 in Oklahoma; 590 in California; and 1,150 in Arizona. The weather during this period was such that screwworms would ordinarily be expected to occur in large numbers. The rainfall was regularly enough to keep wounds moist and attractive for flies, but was not sufficient to drown larvae and pupae in the soil.

Even though a high degree of control was obtained for screwworms in the Southwestern States, the spread of the pest resulted in cases in six counties of Oklahoma, several localities in Kansas, and in Missouri, Illinois, and Tennessee during the early part of the season. In the stockyards men employed by owners to handle cattle looked for cases of screwworms, treated the animals, and aided in getting specimens for identification. At Kansas City, Mo., there were 10 such infestations; at East St. Louis, Ill., 39; at Kaplan and Church Point, La., 3 in horses and mules; at New Orleans 10 lots were identified from 59 different infestations; and at Nashville, Tenn., 1 case was found. Screwworms became established in the vicinity of Memphis, Tenn., and caused losses in several of the southwestern counties of the State. (W. E. Dove, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

MOSQUITOES

Information received from the State entomologist of New York and the Nassau County Extermination Commission indicates that an unusually dry summer on most of Long Island and throughout much of the State resulted in fewer mosquitoes than normal early in the summer and in midsummer but later rains and storms brought out heavy local broods late in the summer and early in the fall. The storms and floods provided extensive breeding places for the fresh-water species, Aedes vexans Meig., Culex pipiens L., and the salt-water breeders, A. sollicitans (Walk.) and A. cantator (Coq.). A large brood of Mansonia perturbans Walk. emerged in Suffolk County N.Y. in June. Along the mid-Atlantic seaboard September storms caused a slight increase in abundance of salt-marsh mosquitoes, but during the rest of the year the numbers were approximately normal. In New Jersey a heavy emergence of A. vexans occurred in the upper Passaic Valley as a result of extensive flood waters. Emergence began about June 26. Immediately after that date some mosquitoes were observed along the lower Passaic, but none were present when a status was taken along the west side of the two mountain ranges toward the upper end of the breeding area. This was about 4 miles from the principal breeding area. By July 4, mosquitoes that probably bred on the upper Passaic, had come across the mountains and filtered into all the towns and cities to the east and south to a distance of some 15 miles from the large breeding area on the upper Passaic River.

In Delaware, conditions for mosquito breeding were more favorable in 1936 than in 1935, with an apparent general slight increase in the number of pestiferous species. However, over a 5-year period there has been a steady reduction in abundance, particularly of the salt-mash species, as indicated by trapping records.

An unusually dry spring and summer was perhaps responsible for a greatly decreased abundance of salt-marsh mosquitoes along the Georgia coast. Annoyance from these pests in that area was reported at its lowest ebb for several years. The dry weather also probably accounted for fewer complaints this year from fresh-water and domestic species.

Data obtained from collections of light traps operated at various places in Florida indicate that generally the relative abundance of the more important species in the State was considerably less in 1936 than in 1935.

Along the Gulf coast, there has been no indication that salt-marsh species of mosquitoes have been more abundant in 1936 than usual. Certain cities and towns in Texas suffered considerable annoyance from A. aegypti (L.) and a few cases of dengue fever were reported; however, no epidemic of the disease occurred.

On the west coast in Oregon and Washington, after the flooding of the Columbia and Willamette Rivers, the primary brood of A. vexans and A. aldrichi Dyar and Knab emerged soon after April 21. Two successive broods emerged on May 18 and June 11 and these species continued to be generally abundant and troublesome until July 17, when high temperatures and low humidity caused a rapid decrease in numbers. C. pipiens caused considerable annoyance in a few localities during the summer in Oregon. Sixty-six cases of malaria were reported in Oregon in 1936, the largest number of cases occurring in the State in any year since 1918, when malaria was first required to be reported to the State Board of Health. Eighty-three percent of these cases occurred in August, September, and October. Anopheles maculipennis Meig., the principal vector of malaria in the State, was found to be very abundant in the vicinity of Prineville, Oreg., although no cases of malaria were reported from that locality. In the Cascade mountains, the snow-water species were reported abundant about May 2. The numbers of these species, however, did not appear to be above the average during 1936. (F. C. Bishopp, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

ROCKY MOUNTAIN SPOTTED FEVER TICKS

Reports from the Rocky Mountain region indicate that the Rocky Mountain spotted fever tick (Dermacentor andersoni Stiles) was about normal in abundance in 1936. Aside from its importance as the vector of Rocky Mountain spotted fever of man, it plays a continuous role in the transmission of tularemia and it is also of distinct importance as a parasite and annoyer of man and animals. This tick has been determined for the first time as occurring in Arizona. This record consists of a male specimen sent from the Lukachukai Mountains, Ariz., on June 23, 1936. The number of cases of Rocky Mountain spotted fever in the West was about normal. The death rate, as usual, varied widely, in different sections, ranging from about 5 to about 80. The total number of cases reported to the United States Public Health Service up to November 1 was 166, and were distributed as follows: Montana 56, Wyoming 45, Oregon 32, Idaho 23, Colorado 7, Utah 1, California 1, and Arizona 1.

The American dog tick (D. variabilis (Say)), which transmits Rocky Mountain spotted fever in the East, appears to have been rather less abundant than normal in the mid-Atlantic States. It was more abundant than usual, however, on Cape Cod and on adjacent islands in Massachusetts. In this area the tick is extremely abundant and annoying to people, dogs, and horses, though fortunately Rocky Mountain spotted fever and tularemia do not appear to exist there.

The number of cases of Rocky Mountain spotted fever in the East this year, as reported to the United States Public Health Service up to November 1, was 142, distributed as follows: Virginia 51, North Carolina 30, Maryland 28, District of Columbia 7, Tennessee 6, Illinois 6, Pennsylvania 5, Delaware 3, Kentucky 3, West Virginia 1, Georgia 1, and Alabama 1. The mortality, as usual, ran about 25 percent. (F. C. Bishopp, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

NEW RECORDS OF INSECTS

Specimens of the following insects have been identified from collections made in the United States. Specimens determined by L. L. Buchanan as Gymnaetron (Rhinusa) netum Germar, a European curculionid not before reported from North America, have been detected in the National Museum collection, mixed with lots of the common G. (R.) teter Fab., the localities represented including points in New York, New Jersey, Connecticut, Pennsylvania, Virginia, and Iowa. The earliest date is July 3, 1914, on specimens collected at Farmingdale, N. Y. A series from Barcroft, Va., was reared by J. C. Bridwell from seed pods of Linaria vulgaris. Two specimens of a weevil identified by L. L. Buchanan as Naupactus leucoloma Boh. were received from A. N. Tissot, Agricultural Experiment Station, Gainesville, Fla. The weevils were reported to be injuring peanuts at Crestview, Fla. This species, which has not heretofore been known from North America, was described from Tucuman, Argentina, and has been reported also from Chile, Uruguay, and New South Wales. At the last-named locality the larvae were found attacking roots of lucerne. Specimens of delphacid, collected on sugarcane at Fellsmere, Fla., on September 26, by J. W. Ingram and E. K. Bynum, of the Bureau of Entomology and Plant Quarantine, have been identified by P. W. Oman as Saccharosydne saccharivora (Westwood). This appears to be the second record of S. saccharivora, a common West Indian species, occurring in the United States, it having been previously recorded by Van Duzee in 1909 from a single specimen collected at Tampa, Fla. Mr. Ingram stated that the species was causing rather severe injury to sugarcane at Fellsmere and that nymphs were also found in small numbers on Digitaria sanguinalis, Paspalum urvillei, and Dactyloctenium aegyptium. References concerning saccharivora in the West Indies indicate that, although the species is common, it is usually not a severe pest of cane. Some of the nymphs included in this sending were parasitized by larvae of a dryinid, according to R. A. Cushman. Two specimens of a parasite reared from Trachelus tabidus (F.) taken at Adamsville, Pa., have been

identified by C. F. W. Muesebeck as Microbracon terebella (Wesm.). The material was reared by E. J. Udine, of the Bureau of Entomology and Plant Quarantine. These are the first specimens of this parasite to be recorded from the United States. Specimens rearer from Pseudococcus comstocki Kuw. by R. N. Jefferson, at Blacksburg, Va., have been determined by A. B. Gahan as the encyrtid Clausenia purpurea Ishii. This species was originally described from Japan and was not previously known to occur in the United States, although an apparently unsuccessful attempt to introduce it into California was made in 1916. Mymaridae reared from eggs of the cotton flea hopper (Psallus seriatus Reut.) at Port Lavaca, Tex., by H. J. Crawford, have been identified by A. B. Gahan as a new species of Erythmelus near gracilis (How.) and Anaphes anomocerus Girault. So far as known, no parasites have previously been recorded from this important cotton insect. The new species of Erythmelus appears to be the more abundant parasite of the two, 54 specimens of that species having been sent in for identification while only 3 specimens of A. anomocerus were submitted. A. anomocerus was originally described by Girault from specimens rearer at Sale Lake City from eggs of Halticus citri Ashm. on alfalfa, and was treated as a variety of A. icle Girault. Mr. Gahan doubts whether the slight differences which distinguish it from A. icle are even of varietal importance. The typical A. icle is said to be parasitic in eggs of Hypera nigrirostris F., and is recorded from Illinois and Virginia. Nothing is known of the distribution of the supposed new species of Erythmelus. Two specimens of a species of Tachinidae reared from Grapholitha molesta Busck by R. B. Neiswander, of the Ohio Agricultural Experiment Station, have been identified by D.G. Hall as Admontia degeeriodes Coq. This appears to be the first record of this host-parasite association.

There was received for identification a series of specimens reared from eggs of the black widow spider at Wichita, Kans., by H.H. Walkden. Several additional specimens of the same species, also reared from the eggs of that spider, were submitted by W. J. Baerg, of the University of Arkansas. C. F. W. Muesebeck has identified the parasite as a new species of Baeus, a genus of Scelionidae. On several occasions recently a dipterous parasite of the black widow spider has been received for identification from southern California and has been determined by David G. Hall as Pseudogaurax signata Loew, a species of Chloropidae. These parasites have been known to develop in the egg sacs of spiders, but seem not to have been previously recorded from the black widow spider. (C. F. W. Muesebeck, Bureau of Entomology and Plant Quarantine, U. S. D. A.)

Corrections--The powder-post beetle damaging lawn furniture, is not Lyctus sp., as published in the Insect Pest Survey Bulletin, Volume 16, Number 9, page 426, November 1, 1936. According to Doris H. Blake, in a paper on the flea beetles.(Proceedings of the Entomological Society of Washington, Vol. 38, No. 2, Feb. 1936, pp. 13-14), the notes on the alder flea beetle (Altica binarginata (Say)) in the Insect Pest Survey Bulletin, September 1, 1936, (p. 348) should be referred to A. ambiens alni (Harr.).